TITLE OF THE INVENTION:

FRONT IMPACT DAMPER

The present invention relates to a front impact damper.

BACKGROUND OF THE INVENTION

As is known, front impact dampers are deformable metal structures erected along the outer edge of a highway, at forks, median strips, gaps in guardrails, or to shield trees, reinforced concrete pillars and similar obstacles along the edge of a highway, to stop vehicles headed towards the obstacle, to gradually absorb all the kinetic energy of the vehicle, and so ensure deceleration below current regulation thresholds.

At present, the most commonly used front impact dampers comprise a prismatic, triangular- or trapezoidal-base tank made of plastic material, secured to the ground immediately upstream from the obstacle, and filled with water to absorb vehicle impact.

Another widely used front impact damper comprises a supporting post fixed vertically into the ground immediately upstream from the obstacle; and a deformable tubular metal member fixed vertically to the top end of the supporting post and projecting on the opposite side to the obstacle.

Front impact dampers of the above type have the major drawback of failing to provide for effectively absorbing the kinetic energy of the vehicle, and can therefore only be erected along relatively slow roads.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a front impact damper with a much greater capacity to absorb the kinetic energy of the vehicle as compared with currently used dampers.

According to the present invention, there is provided a front impact damper, characterized by comprising a vertical supporting member secured firmly to the ground; and a number of deformable tubular members fitted inside one another and fixed to said vertical supporting member at a given height off the ground.

BRIEF DESCRIPTION OF THE DRAWINGS

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a side view of a front impact damper in accordance with the teachings of the present invention;

Figure 2 shows a plan view of the Figure 1 front impact damper;

Figures 3 and 4 show a side view and plan view respectively of a variation of the front impact damper in Figures 1 and 2.

DETAILED DESCRIPTION OF THE INVENTION

Number 1 in Figures 1 and 2 indicates as a whole a front impact damper specially designed for location upstream from a small-size obstacle along the edge of a highway – e.g. the end of a median strip of similar – to stop vehicles headed towards the obstacle, gradually absorb all the kinetic energy of the vehicle, and so ensure deceleration below established thresholds.

Two or more front impact dampers 1 may obviously be located side by side along a stretch of the edge of a highway to form a short road barrier particularly suitable for shielding medium-size obstacles, such as large trees, boundary walls or reinforced concrete pillars.

Front impact damper 1 substantially comprises a vertical supporting member 2 secured firmly to the ground; and a number of deformable tubular members 3 fitted inside one another and fixed preferably, though not necessarily, vertically to vertical

supporting member 2 at a given height off the ground.

More specifically, in the example shown front impact damper 1 comprises three deformable tubular members 3 fitted inside one another, and each defined by a single portion of W- or triple-groove-section corrugated sheet metal 4 bent into a loop to overlap the two ends and so form a cylindrical tubular body with a corrugated lateral wall and a constant radius of curvature.

The three deformable tubular members 3 must obviously decrease gradually in outside diameter to fit easily inside one another and allow a certain amount of mechanical clearance between them.

Deformable tubular members 3 may obviously be other than cylindrical, e.g. as opposed to a circular section, may have a square, rectangular, octagonal, or at any rate closed-polygonal section, preferably, though not necessarily, with rounded corners.

In this case too, deformable tubular members 3 may be formed from a single portion of corrugated sheet metal bent, if necessary, with a variable or constant radius of curvature.

With reference to Figure 2, in the example shown, the largest-diameter, i.e. outer, deformable tubular member 3 is positioned vertically with its outer lateral surface resting on the top end of vertical supporting member 2; and the other two deformable tubular members 3 are positioned vertically one inside the other and both inside the outer deformable tubular member 3, so as to rest one on the other at the point at which outer deformable tubular member 3 is secured to vertical supporting member 2, thus enabling all three deformable tubular members 3 to be secured simultaneously to vertical supporting member 2.

In other words, the three deformable tubular members 3 are tangent to one another at the fastening point to vertical supporting member 2, so that one set of through bolts can be used to secure all three deformable tubular members 3 to vertical supporting member 2.

With reference to Figures 1 and 2, in the example shown, vertical supporting member 2 is defined by an H- or U-section metal bar 5 driven vertically straight into the ground, and by two collapsible spacer members 6 interposed between the top end of metal bar 5 and the body of outer deformable tubular member 3.

In the example shown, each collapsible spacer member 6 is fixed to the top end of metal bar 5 by a number of through bolts inserted inside slots formed in the two wings of bar 5.

Operation of front impact damper 1 is easily deducible from the foregoing description with no further explanation required.

The advantages of front impact damper 1 as described and illustrated herein are obvious: providing two or more deformable tubular members 3 fitted inside one another greatly increases the amount of kinetic energy that can be absorbed in the event of impact by a vehicle travelling in direction d, while the mechanical clearances between deformable tubular members 3 enable them to deform sequentially to absorb the kinetic energy of the vehicle more gradually and so reduce maximum deceleration of the vehicle.

Clearly, changes may be made to front impact damper 1 as described and illustrated herein without, however, departing from the scope of the present invention.

More specifically, in the Figure 3 and 4 variation, each deformable tubular member 3 may be defined by a single portion of W- or triple-groove-section corrugated sheet metal 7 bent substantially into a C, i.e. without overlapping the two ends, so as to form a cylindrical tubular body with a corrugated lateral wall, a constant radius of curvature, and a through longitudinal slit extending the full height of the cylindrical tubular body.

In this case, as opposed to being tangent to one another at the same point, the three deformable tubular members 3 are tangent at the longitudinal slit, so that the two end portions 7a of the portion of corrugated sheet metal 7 of each are

superimposed on the corresponding end portions 7a of the other two portions of corrugated sheet metal 7 defining the other two deformable tubular members 3.

In the Figure 4 variation, vertical supporting member 2 is defined by two U-section metal bars 8, each fixed vertically directly on the ground so as to face a respective end portion 7a of the portion of corrugated sheet metal 7 defining each deformable tubular member 3; and by two pairs of collapsible spacer members 9, each pair of which is interposed between one of the two end portions 7a of the three portions of corrugated sheet metal 7 and the corresponding metal bar 8.

It should be pointed out that, in the example shown, each collapsible spacer member 9 is fixed stably to end portions 7a of the three portions of corrugated sheet metal defining the three deformable tubular members 3 by means of through bolts, rivets, or similar fastening systems, but is fixed to the top end of metal bar 8 by one or more through bolts inserted inside slots formed at programmed-deformation portions of collapsible spacer member 9.